

## **Facies Analysis of Cretaceous Strata from the Umiat Wells, National Petroleum Reserve, Alaska**

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The Umiat anticline, located along the Colville River at the southeastern boundary of the National Petroleum Reserve, Alaska (NPRA), lies at the leading edge of the Brooks Range fold-and-thrust belt. The anticline is largely composed of Cretaceous units of the Torok, Nanushuk, Seabee and Tuluva formations. Between 1944 and 1953 the U.S. Navy drilled 11 test wells at Umiat to investigate petroleum potential of the sandstones and shales that make up the anticline. Investigations determined that the Nanushuk was a viable petroleum reservoir, but complications due to the reservoir's shallow depth and presence of permafrost prevented further resource exploitation.

Current research reexamines cores taken from 5 of the 11 Umiat wells using modern facies analysis. Whereas previous studies of the Umiat cores conducted in the 1950's and 1970's focused solely on the characteristics of sandstone units, this study reassesses the sandstone units in the context of associated shales, siltstones and coals. An understanding of the complexity of the facies associations and facies successions allows for an in-depth interpretation of depositional systems and provides a more detailed framework for facies modeling.

Based on sedimentary structures (ripple cross lamination, cross bedding, mud drapes), grain size changes, leaf fossils and invertebrate fossils, and ichnofossils observed in cores from selected wells, the various depositional systems at Umiat include prodelta sandstones and shales of the Torok and Seabee formations, tidally-influenced, shallow marine deltaic and shoreface sands of the Nanushuk Formation, and shoreface sands and delta-plain coals of the Tuluva Formation. These observations support prior investigators' outcrop, well-log, and seismic studies that interpreted the Torok-Nanushuk and Seabee-Tuluva at Umiat as representing two major depositional sequences. Further integration of the results of this study with outcrop data still to be collected will enhance understanding of depositional environments and allow for more detailed modeling of vertical and lateral variation at Umiat.